Previous studies found a relationship between the onset of migraine headaches and negative affect (anger, depression, and anxiety). Suppressed anger, or anger turned inward, was found to be an aspect of migraine headaches. This study attempted to support previous research on anger-in. The Anger Disorders Scale (ADS-VI-R) was used. This is a new instrument developed specifically to assess multidimensional aspects of anger, especially in clinical populations. No evidence was found to support significantly different levels for the trait of anger-in, between the control group and the migraine headache groups. Coercion, a form of anger turned outward, was found to be significant between the outpatient general medical migraine headache group and the nonheadache control group. Those in treatment for migraine headaches were found to be no different from control subjects on mean scores on the instrument.

**Key words:** anger; anger disorder scale; anger-in; coercion; migraine headache; negative affect

**Introduction**

Over the years, researchers have attempted to determine the etiological factors for headaches. Early on, psychoanalysts and clinicians reported a number of specific personality traits associated with patients who experienced migraine headaches. Schnarch and Hunter (1979) reviewed the early literature and identified that the predominant personality trait associated with migraine headaches was repressed hostility. In addition to repressed hostility, the authors also reported the following traits: unexpressed anger, rigid superego, intolerance of frustration,
perfectionism, pregenital fixation, sexual maladjustment, unresolved parental attachment, poor interpersonal relationships, a strong yet overworked drive to achieve, feelings of resentment, rigidity, and inflexibility. Besides repressed hostility and unexpressed anger (often referred to as anger turned inward), a number of the above identified traits (rigid superego, intolerance of frustration, perfectionism, strong achievement drive, feelings of resentment and rigidity/inflexibility) may be regarded as what Ellis (1995) and Dryden (1990) refer to as low frustration tolerance (LFT) which they find leads to feelings of anger.

According to Schnarch and Hunter (1979) the results from the above cited studies had their weaknesses. Their designs had flaws that led to questionable conclusions. More recently, studies have looked closely at both state and trait aspects of anger and hostility using more sound research designs (including control groups, use of psychological instruments, and self-ratings scales), yet each study has its own limitations.

**Literature Review**

Martin and colleagues have studied the relationship between mood and headaches, as well as the triggers (antecedents) for migraine and tension headaches. Martin, Nathan, Milech, and van Keppel (1988), reported on different moods including “anxiety, hostility, depression, unsureness, tiredness, and confusion” (p. 353) that correlated with headache intensity on the same day that the headache occurred. However, the intensity was small and no one mood was found to be more significant than others.

Martin, Milech, and Nathan (1993), identified five factors that are antecedents to headaches, based on subjects’ self-reports. Factor one (negative affect) consisted of anxiety, anger, and depression; factor two was visual disturbance (flicker, glare, and eye strain); factor three was somatic disturbance (sexual activity, sneezing, coughing, and pollen); factor four was environmental stress (humidity, high temperature, and the opposite of relaxation); and factor five was consummatory stimuli (alcohol, certain foods, and hunger).

Subjects in the Paulin, Waal-Manning, Simpson, and Knight (1985) study reported that mental stress, along with too much alcohol (for men only), tiredness, and eye strain were causes of headache (non-specified type). Based on test scores, negative emotions (trait anxiety and anger, along with depression) were found to increase linearly with the frequency of headaches.

Martin and Seneviratne (1997) and Martin and Teoh (1999), based on the findings from the Martin, Nathan, Milech, and van Keppel (1988) study, specifically examined the relationship between negative affect and the variables for hunger and visual disturbance as triggers of headaches. In both studies, they concluded that negative affect can precipitate headaches.

However, each of the above studies had its own limitations. Migraine, tension, or a combination of both types of headaches were combined as a group, thus limiting the strength of the findings for migraine-only headaches (Martin, Nathan, Milech, & van Keppel, 1988). While the study by these authors also found that
subjects reported negative affect as an antecedent to headaches, the correlation between same-day headache (compared to the day before and the day after) was low and “no particular emotion emerged as being more closely related to headaches than others” (p. 354).

In the study by Martin, Milech, and Nathan (1993), the authors again did not study subjects by type of headache, but instead combined them (migraine, tension, or both) and looked at headaches as being chronic. They also had subjects report on their mood, or negative affect (anxiety, anger, and depression), as it either precipitated or aggravated the headache, thus making it difficult to determine if the negative affect (mood) was a trigger or an aggravator of headaches.

The studies that examined the impact of negative affect, along with either hunger (Martin & Seneviratne, 1997) or visual (Martin & Teoh, 1999) disturbance as antecedent factors, both used a stressor challenge that was similar to and adopted from what had been used by anxiety researchers. This raises the question as to whether or not the stressor actually elicited anger. Finally, Martin and colleagues combined anxiety, anger, and depression together, thus making it unclear as to the specific relationship between any one of these moods as an antecedent of headaches.

Paulin, Waal-Manning, Simpson, and Knight (1985) used a self-report questionnaire to assess for trait anger, along with measures for trait anxiety and depression. The scores on the three instruments were correlated with headache frequency. The researchers reported a significant relationship between headache frequency and scores for trait anger, as well as anxiety and depression in both men and women. The psychometric scores for these traits were particularly higher for those subjects with the most frequent headaches. Subjects were asked what type of headache they thought they had, plus the researchers apparently only asked where the headache was located and if their type of headache had been diagnosed by a physician. Again, it is difficult to determine if the subjects in this study were suffering from migraine, tension, or other type of headache making it difficult to establish a clear relationship between trait anger and migraine headaches.

When comparing severe migraine patients with severe non-migraine headache patients for personality differences, Schnarch and Hunter (1979) identified two significant differences between the groups: fear of expressing anger, and suspicion of other people, both of which were higher for the migraine group. Though the findings are important, the psychological instrument measuring hostility had its weaknesses. Apparently this earlier edition of the instrument “failed to produce a factor structure that supports the subscales of the test” (DiGiuseppe & Tafrate, p. 2) and it has since been revised.

Kinder, Curtis, and Kalichman (1992) examined chronic (primarily tension and vascular) headache sufferers for psychopathology and reactive depression, based on profiles from the Minnesota Multiphasic Personality Inventory (MMPI). Of the 229 subjects studied, four groups were identified. Thirty-eight were found to have reactive depression and 15 with psychopathology. The two remaining groups were comprised of subjects with normal MMPI profiles. All subjects were
administered instruments measuring anger. Between the normal groups, the reactive depression, and psychopathological groups, scores for the males and females in the latter two groups mirrored each other. Subjects in the psychopathological group appeared to be more distressed with significant higher trait anger, anger expression, and anger-in, plus anxiety and depression. These subjects were described by Kinder et al. as “chronically anxious and angry individuals who particularly have difficulty in the appropriate expression of their angry feelings. They seem to turn their anger inward...” (p. 522). A main weakness in the study is that the types of headaches in the two groups were not differentiated. Results cannot determine if these effects generalize to all types of chronic headaches or for migraine or tension headaches only.

Henryk-Gutt and Rees (1973) examined psychological factors that may contribute etiologically to migraine headaches. Regarding anger, the researchers found the following factors associated with classic migraine headaches when compared with nonheadache controls: significantly higher scores for the factor measuring hostile behavior, which was comprised of assault, indirect hostility, verbal hostility, and irritability. This was found for both men and women. No difference between women with classic and common migraine headaches was found for this factor. Further, the findings from this study suggested that there is “evidence for increased reactivity of the autonomic nervous system in migraine subjects and that this may provide a predisposing factor for the development of migraine attacks” and that “emotional stress can act as a precipitating factor in migraine” headaches (p. 141). As previously cited in the review of the study by Schnarch and Hunter (1979), the instrument used to measure hostility was one that failed to support the subscales of the instrument through factor analysis.

Studies that specifically examine state aspects, a transitory or situationally-related response to a stimulus which is likely to vary, as compared to trait aspects of anger, a proneness or disposition to respond a certain way and is relatively unfluctuating (Endler & Okada, 1975), have found significant results. Migraine subjects, when placed in an anger-provoking situation, were observed to have expressed less anger and to react differently physiologically when compared to pain patients and healthy controls (Grothgar & Scholz, 1987). Specifically, the changes noted were not found on the self report of anger using an adjective check-list, an instrument used to identify “changes of actual states” (p. 207), but on a behavioral level measured by raters observing outward behaviors. Further, physiological changes were found with diastolic blood pressure increasing and pulse pressure decreasing. The authors reported that the physiological changes suggested an anger-in pattern.

According to DiGuisepppe and Tafrate (n.d.), “negative affectivity usually includes measures of depression, anxiety and other negative emotions” (p. 1). Using factor analysis, these authors suggest that anger is a separate construct from that of the more global negative affectivity. Combining anger, anxiety, and depression into one factor, negative affect, does not allow for the specific examination or planning of interventions. Each affect results in a different emotional experience and, therefore, calls for specific assessment and interventions.
Studies have examined the psychological factor of state and trait anger as a contributor to the etiology of migraine headaches. Results have compared migraine headache subjects with: tension headaches, with no headache controls, and with chronic pain. Data was collected and analyzed from: self-reports through daily diaries of headaches, clinical observations of behaviors, self-report of moods, and psychological and physiological measures. However, as noted in the review of literature, the above studies have their limitations and still leave questions about the relationship between migraine headaches and anger. The variable for migraine headache needs to be better controlled as well as the use of a measure of anger that is multidimensional and based on sound theoretical constructs of anger as a psychological trait.

Psychometric instruments measuring anger are relatively few. Until recently, all of them assessed anger as a normally distributed trait. DiGuiseppe and Tafrate developed the sixth revision of the Anger Disorder Scale (ADS-VI-R). The ADS-VI-R is a multidimensional instrument that assesses cognitive, emotional, physiological, and contextual components of trait anger utilizing current theoretical constructs. “Based on factor analytic research . . . the ADS provides a total score and 13 subscale scores” (anger-in, physiological arousal, physical aggression, verbal aggression, rumination, poor self-control, coercion, duration of anger as a problem, episode length, scope of anger, hurt/social rejection, resentment, and suspiciousness) (DiGuiseppe & Tafrate, n.d., p. 6). It is a 74-item questionnaire with responses based on a 1 to 5 Likert scale. A Cronbach Alpha coefficient for the total scale was .95, while the range for each of the 13 subscales was from .73 to .89 (DiGuiseppe & Tafrate, n.d.). Further, the ADS purports to be able to “distinguish anger as a mental health problem” (p. 5). This design was specifically conceptualized by the authors in order to provide clinicians with an instrument that had the ability to distinguish between degrees of disturbance in order to better recognize anger problems in need of clinical intervention.

The purpose of the current study was to examine trait anger, from a multidimensional aspect, among subjects assessed with a migraine headache. Subjects with a history of migraine headaches were compared with a control group of subjects that did not suffer from migraines. It was hypothesized that persons suffering from migraine headaches would have significantly more trait anger, as suggested from the review of literature. Specifically, anger-in or suppressed anger was hypothesized as being greater for migraine headache sufferers when compared with nonmigraine headache controls, as measured by the ADS-VI-R.

Design

Subject Selection Criteria

All subjects were adults, 18 and older, who voluntarily agreed to participate in the study. Subjects were recruited from two outpatient medical facilities affiliated with a university medical school in the intermountain west (an outpatient general medical clinic and a neurological clinic specializing in the treatment of headaches). A random sample of subjects in each group was taken based on times...
and days. Three groups were included in the study. They consisted of the following: an outpatient general medical clinic nonmigraine headache (GMNH) control group; outpatient general medical clinic (GMH) migraine headaches; and outpatient neurological headache clinic (HC) migraine headaches.

Random blocks of time for recruitment of subjects, 90 minutes each, were identified within a set of dates covering an eight-week period. Researchers contacted subjects while they visited the clinics for regular appointments. In the outpatient general medical clinic, subjects who self-reported as having significant problems with headaches were recruited for the migraine group and those who self-reported not having problems with headaches were recruited for the control group. All subjects at the neurological clinic that had been previously seen by a physician or physician’s assistant and had been diagnosed with a migraine headache were recruited during the random blocks of time.

Subjects in all three groups were first given the headache questionnaire to fill out. The items on the headache questionnaire were based on the International Headache Society criteria for the common and classic migraine headache (Silberstein, Lipton, & Goadsby, 1998). If responses from subjects in the outpatient clinic did not meet the criteria for migraine headache they were placed in the GMNH control group. Subjects in the outpatient clinic that met the criteria for migraine headache were included in the GMH group. All subjects in the HC group (100%) met the criteria for migraine headache based on responses to the headache questionnaire.

Responses on the headache questionnaire from subjects in the outpatient general medical clinic that did not clearly differentiate migraine from nonmigraine subjects were reviewed by a neurologist. If the physician was unable to accurately identify the respondent as being in either the migraine or nonmigraine headache group the respondent was not included in the study.

All subjects meeting the criteria for admission into one of the three groups were administered the ADS-VI-R. When possible, subjects finished the ADS-VI-R at the clinic. However, some subjects were unable to finish the instruments (ADS-VI-R and headache questionnaire) during the time of their appointment. These subjects were given a self-addressed stamped envelope and were asked to mail the instruments to the researchers. The rate of return for the three groups were as follows: GMNH group (84%); GMH group (87%); and the HC group (96%).

**Results**

**Research Questions**

This results section begins with analyses of the participants’ data on important demographic variables to assure the comparability of the groups before addressing the three primary research questions in this study. The first question, used to assess the effect that the dependent variable measure may have had on the results, was, What were the levels of internal consistency associated with the overall and clinical subscales of the ADS-VI-R? The second question was, Did the three clinic
groups differ on their overall anger instrument scores? The third question was, Did the three clinic groups differ on their clinical subscale anger instrument scores?

Data Analyses

Sample Size. There were 79 participants in the study. A statistical power analysis (Cohen, 1988), prior to recruiting participants, indicated that given a moderate effect size there would be a need for at least 21 participants to be recruited from each group to achieve a power coefficient of .80. For each group, this target sample-size was exceeded. There were 27 participants each from the GMNH and GMH groups, and 25 from the HC group. For each statistical analysis conducted, a separate power analysis was also conducted to ascertain the exact level of statistical power achieved.

Demographics. Among the 79 participants the average age was 38.7 years (s = 15.39), with one participant (1.3%) not listing their age. The average age for the GMNH, GMH, and HC groups were 35.7 (s = 13.83), 38.3 (s = 17.84), and 43.1 (s = 14.15), respectively. The three groups did not differ significantly on age. There were five participants (6.3%) who did not report their gender, and among those 74 who did report it there were 19 (25.7%) males and 55 (74.3%) females. In the GMNH, GMH, and HC groups there were 6, 7, and 6 males and 20, 17, and 18 females, respectively. The three groups did not differ significantly in their gender composition. One participant (1.3%) did not report their race, and among the other 78 there were 72 (92.3%) white and 6 (7.7%) participants who were members of racial minority groups. The GMNH, GMH, and HC groups included 24, 26, and 22 white and 2, 1, and 3 minority participants, respectively. There were no significant differences between the three groups in their racial composition.

Summary. The number of participants recruited exceeded the target sample-size for all three groups. No statistically significant difference occurred between the groups on age, gender, or racial composition. Given that three hypothesis tests were conducted and each were evaluated at an unadjusted alpha level of .05, the family wise Type I error rate (Keppel, 1991) for these tests was .15. Because significant differences did not emerge at that more liberal alpha level, the groups were quite comparable on important demographic variables.

Internal Consistency

The internal consistency of the overall anger instrument and the clinical subscales was assessed using Cronbach’s Alpha Coefficient (Cronbach, 1951). As one can see in Table 1, the full scale of the anger instrument had an alpha coefficient of .97, with 66 out of 79 cases (83.5%) having full data for the computation. The 13 clinical subscales had alpha coefficients that ranged between .72 and .93, with calculations including between 74 (93.7%) and 78 (98.7%) cases. Based on the proportions of the full sample of cases included, and the obtained alpha coefficients, one can safely conclude that the ADS-VI-R was reliable within this sample. These internal consistency data support the idea that the dependent variable mea-
Full-Scale Comparison

Raw scores on the full scale of the ADS-VI-R were converted to T scores, based on national norms provided by DiGuiseppe and Tafrate (n.d.). The GMNH, GMH, and HC groups had mean full-scale T scores of 41.2 (s = 4.5), 46.1 (s = 11.1), and 44.9 (s = 14.4), respectively. The groups were compared using a one-way analysis of variance (ANOVA) (Keppel, 1991), and they did not significantly differ from each other at the .05 alpha level. Clinic setting explained only 4% of the variance in full-scale scores on the anger instrument, and the power coefficient for this analysis was .18. Although the variances appear different from each other in the descriptive data, the Levene’s Test of Equality of Error Variances revealed that the homogeneity-of-variance assumption was met (F(2, 40) = 2.33, p = .11).

Although the full-scale results were not statistically significant, the hypothesis tests based on the clinical subscale scores were still conducted. The ADS-VI-R developers state that while full-scale scores may be within the range of the normal population for an individual, there may still be clinical subscale scores that indicate problematic anger for that individual. Therefore, the researchers proceeded with the clinical subscale hypothesis tests to assess the extent to which this occurred in this sample at an aggregate level.

Clinical Subscale Comparisons

The hypothesis that the three groups differed on the clinical subscales was tested using one-way ANOVA (Keppel, 1991), with a clinic setting as the independent variable and T scores on each of the ADS-VI-R clinical subscales as the dependent variables for each of these 13 hypothesis tests. When results were statistically
significant, two planned orthogonal contrasts (Keppel, 1991) were conducted, one contrasting the GMNH and GMH groups, and one contrasting the GMNH and HC groups.

Before embarking on hypothesis tests involving the clinical subscales, the inflated probability of committing a Type I error associated with multiple hypothesis tests (Keppel, 1991) had to be addressed. There were 13 clinical subscales and the same number of associated hypothesis tests. To statistically account for the family wise Type I error rate the basic alpha level of .05 was divided by 13, the number of tests, with the quotient of .004 used as the criterion alpha for statistical significance. For the planned orthogonal contrasts, the .004 alpha-level associated with the omnibus $F$ tests was divided by two, and the resulting quotient of .002 was used as the criterion for statistical significance of the contrasts.

Omnibus $F$ Tests

Among the 13 scales only the coercion subscale emerged as one on which significant between groups differences appeared. The grand mean for the coercion scale $T$ scores was 48.3 ($s = 10.85$), and the means for the GMNH, GMH, and HC groups were 45.4 ($s = 7.99$), 54.2 ($s = 11.69$), and 44.9 ($s = 10.18$), respectively.

In addition to the omnibus $F$ test results, as displayed in Table 2 ($F(2, 77) = 6.99, p = .002$), clinic setting explained 15.7% of the variance in coercion-subscale scores, and the power coefficient for this analysis was .92. The Levene’s Test demonstrated that the homogeneity of variance assumption was met in this analysis ($F(2, 75) = 1.36, p = .26$). The results of the omnibus $F$ test showed an overall significant difference between clinic settings, and model evaluation indicated that these findings were likely to be associated with true between group differences, so pair wise contrasts were appropriate.

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</table>

**Pairwise contrasts.** Two planned orthogonal contrasts (Keppel, 1991) were conducted, one contrasting the GMNH and GMH groups, and one contrasting the GMNH and HC groups, with $T$ scores on the coercion clinical-subscale as the dependent variable. The mean difference between the GMNH and GMH groups was 8.73 ($s = 2.77$) and this difference was statistically significant at the .002 alpha level. The mean difference between the GMNH and HC was -.50, which was not statistically significant ($p = .86$).

**Summary.** The results, as displayed in Figure 1, demonstrate that participants who had migraine-headache symptoms and were seen in a general medical setting scored significantly higher on the coercion clinical subscale than their general
medical counterparts who did not suffer from migraine symptoms. The data met the requisite assumptions of ANOVA (Keppel, 1991) and good statistical power (Cohen, 1988) was achieved. When these characteristics of the analysis are taken with the good internal consistency of the coercion scale, one can place their confidence in these findings.

Discussion

Based on three groups’ self-reported aspects of anger, from a multidimensional perspective, the results from this study found only one significant difference between subjects meeting the criteria for common or classic migraine headaches from those without migraines. The difference found was for the factor of coercion, a behavior used “as a means of controlling other people” (DiGuiseppe & Tafrate, n.d., p. 13) in the group of subjects meeting the criteria for common/classic migraine headaches that were not specifically treated for the medical condition.

Coercion is an element of anger that is expressed outwardly. Thus, the results from this study does not support previous researchers’ findings suggesting that migraine headache sufferers experience more trait anger or hostility in general or specifically anger turned in, when compared with nonmigraine subjects, according to the self-reported results on the ADS-VI-R. Specifically, there was no significant difference for the full-scale-factor instrument mean scores for anger or the mean subscales-scores assessing various aspects of anger except for coercion.

This study does suggest, however, that people with untreated migraine headaches are more likely to direct their anger outwardly toward other people or objects as evidenced by the mean scores on the factor for coercion. Further, the data suggests that those subjects who were diagnosed with migraine headaches and were actively participating in specialized treatment for their headaches were generally found to have no more anger on any of the self-reported factors measured by the ADS-VI-R than the nonheadache control group.
Because these results differ significantly from what has previously been reported in the literature, it is recommended that this study be replicated in order to confirm or refute what has been found here. Further, studies need to determine if the anger experienced by those suffering from migraine headaches who may not be actively or aggressively involved in specific treatment for their migraines may be feeling and expressing coercive behavior, at least in part, due to the pain caused by migraine headaches.

The results regarding the coercion subscale again indicate that those who may be untreated or undertreated for migraine headaches may have a tendency to use their anger to control others. However, this conclusion is not strongly supported since the mean $T$ scores did not rise to the level of clinical significance. According to the ADS-VI-R manual, a $T$ score of 70 is typically used for interpretation of psychological tests which identifies a significant or clinical problem. A score of this magnitude would most likely warrant some type of intervention. It represents two standard deviations above the mean. Given the small and localized standardization sample for this test, the ADS-VI-R authors (DiGiuseppe & Tafrate, n.d.) recommended a more liberal $T$ score of 68 as the cut-off point for interpretation. This becomes significant from a treatment or clinical standpoint because people should not be inaccurately labeled with a problem when one does not exist.

On further examination of mean $T$ scores for the coercion subscale, this study found that the mean $T$ scores for this variable fell below one standard deviation from the mean, or was within the normal range for the GMH group (mean $T$ score of 54.2, $s = 11.69$). Again, further study of this variable and how it is associated with migraine headaches is needed.

It is recommended that migraine headache sufferers, especially those who receive specialized treatment, be studied before treatment is begun. Subjects should also be compared with those already in treatment to further determine if anger is a component of the pain associated with the headache or more of a personality trait associated with the etiology of the problem.

Further, the migraine headache sufferers may not be good self-reporters of anger, thus confounding the ability to help them work on a problem that is not recognized as such. This under-reporting was found in the Grothgar and Scholz (1987) study of state aspects of anger. Subjects did not self-report anger when asked to respond to an adjective checklist identifying actual changes in their mood. However, physiological changes were found that suggested a pattern of anger turned inward.

References


